

28.161 Groundwater
26gsr sampling results,
Livingston Rail
Yard, Livingston,
Montana

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**JULY 1990 MONTHLY
GROUND WATER SAMPLING RESULTS
LIVINGSTON RAIL YARD
LIVINGSTON, MONTANA**

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**JULY 1990 MONTHLY
GROUND WATER SAMPLING RESULTS
LIVINGSTON RAIL YARD
LIVINGSTON, MONTANA**

Submitted to:

**Montana Department of Health
and Environmental Sciences**
Cogswell Building
Helena, Montana 59620

Submitted by:

Burlington Northern Railroad
9401 Indian Creek Parkway
Overland Park, Kansas 66201

Prepared by:

Envirocon, Inc.
101 International Way
P.O. Box 8243
Missoula, Montana 59807

Submittal Date:

October 2, 1990



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1.0 INTRODUCTION

Burlington Northern Railroad (BNRR), through its contractor Envirocon, Inc. (Envirocon), took ten ground water samples on July 27, 1990. Eight samples were taken from seven monitoring wells on and around the Livingston rail yard and one was taken from the B Street Municipal Water Well of the city of Livingston, Montana. One sample was a field duplicate and one was a trip blank.

Energy Laboratories, Inc., of Billings, Montana, analyzed four of the samples for volatile organic compounds (VOCs) by EPA Method 524.2 and the other six for purgeable halocarbons (POXs) by EPA Method 601. Table 1.0 summarizes the sample and well numbers, the sampling methods and dates, and the analytical methods. Figure 1.0 shows the well locations and summarized analytical results. Appendix A contains the complete laboratory analytical results.

2.0 RESULTS AND INTERPRETATIONS

The analytical results from most locations of the July sampling round are consistent with previous monthly results. Notable changes in chlorinated compound concentrations occurred at Wells LS-8 and 89-4. The analytical results from these wells and the B Street Municipal Well are discussed below.

TABLE 1.0
CORRELATION OF WELL AND SAMPLE NUMBERS
JULY 1990

SAMPLE NUMBER	WELL NUMBER	SAMPLE METHOD	SAMPLE DATE	ANALYTICAL METHOD*
140101-498	Trip Blank	-	7/27/90	601
140101-499	B Street	Tap	7/27/90	524.2
140101-500	L-87-7	DBP	7/27/90	524.2
140101-501	89-2	DBP	7/27/90	524.2
140101-502	Dup. of 89-2	DBP	7/27/90	524.2
140101-503	LS-8	DBP	7/27/90	601
140101-504	L-88-10	DBP	7/27/90	601
140101-505	89-4	DBP	7/27/90	601
140101-506	L-87-5	DBP	7/27/90	601
140101-507	L-87-2	DBP	7/27/90	601

NOTES: * Refers to EPA analytical method
DBP - Dedicated bladder pump

A more complete interpretation of monthly and seasonal variations in chlorinated compound concentrations will be presented in the Remedial Investigation Report - Ground Water and the August 1990 Quarterly Ground Water Sampling Results Report.

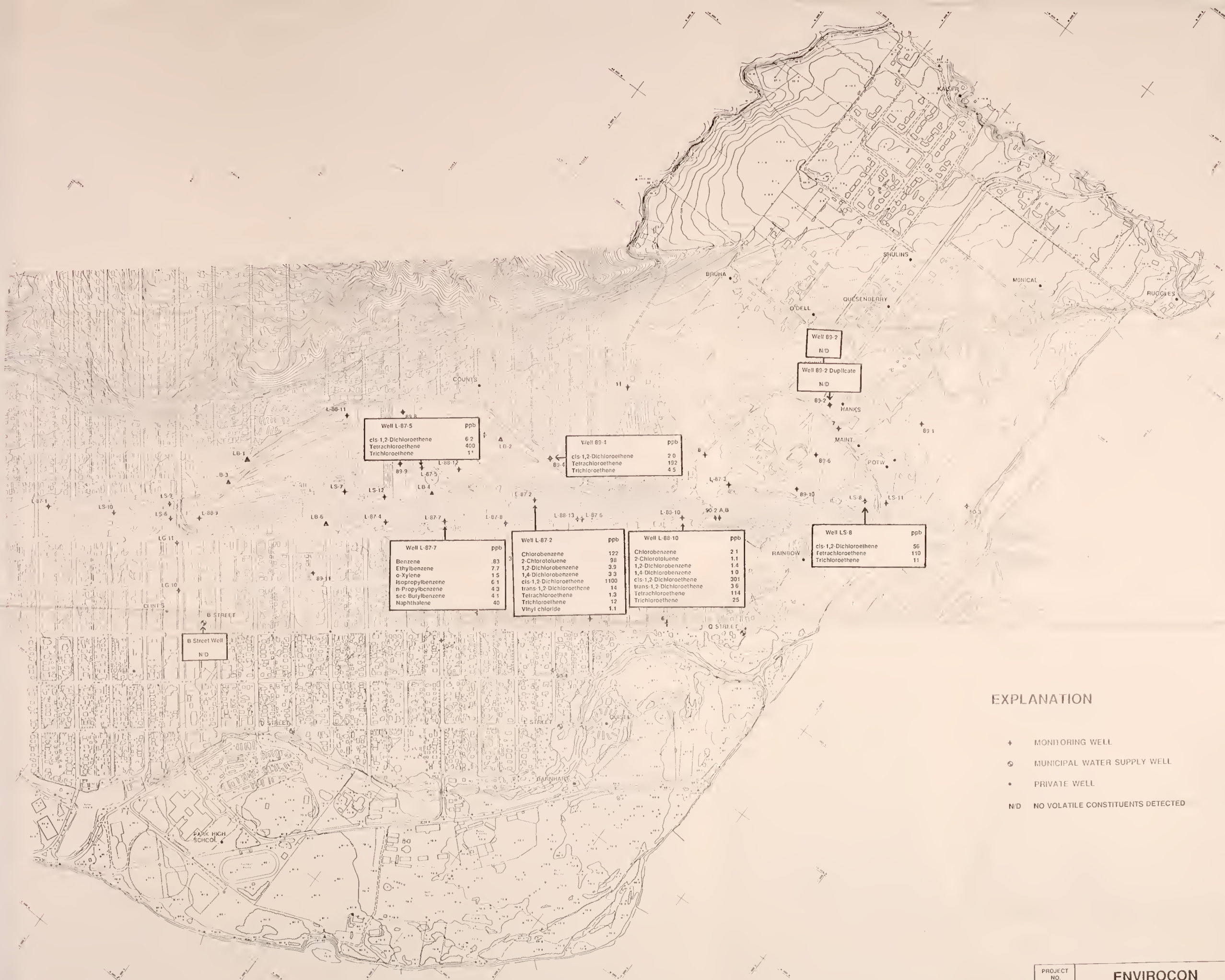
The analytical results from Well LS-8 show a decrease in chlorobenzene concentration from 9.3 parts per billion (ppb) in June 1990 to <1.0 ppb in July 1990. This drop is consistent with trends noted at this well during 1989 and may be due to seasonal variations in ground water flow direction and in the volume of water in the aquifer.

The analytical results from Well 89-4 show a decrease in tetrachloroethene (PCE) concentration from 370 ppb in June 1990 to 192 ppb in July 1990. This value is the smallest PCE concentration yet seen at Well 89-4. The PCE concentration has dropped each month since May 1990, which may be due to dilution during annual ground water recharge.

The analytical results from the B Street Municipal Well show no detectable concentrations of VOCs. This is consistent with previous monthly and quarterly analytical results.

3.0 QA/QC RESULTS

Envirocon followed the Quality Assurance/Quality Control (QA/QC) Program, outlined in the Interim Remedial Measures Work Plan (IRMWP), during the July 1990 sampling round. The trip blank analytical results show no detectable concentrations of any Method 601 analytes, as shown in Appendix A. The analytical results of the field duplicate from Well 89-2 closely match the results of the original sample, as shown in Appendix A and on Figure 1.0.



EXPLANATION

- ✦ MONITORING WELL
- ⊙ MUNICIPAL WATER SUPPLY WELL
- PRIVATE WELL
- N/D NO VOLATILE CONSTITUENTS DETECTED



PROJECT NO.	140101
DATE	7/90
REVISION	

ENVIROCON

FIGURE 1.0
JULY 1990
MONTHLY GROUND WATER
SAMPLE RESULTS
LIVINGSTON RAIL YARD
LIVINGSTON, MONTANA

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APPENDIX A

LABORATORY RESULTS

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PO BOX 8243
MISSOULA MT 59807

Water Analysis

PROJECT: Livingston / BN

LAB NO.	90-20387	90-20388	90-20389
SAMPLE IDENTIFICATION	140101-506	140101-507	140101-498
SAMPLE SUBMITTED	07/30/90	07/30/90	07/30/90
DATE REPORTED	08/15/90	08/15/90	08/15/90
SAMPLE DATE	07/27/90	07/27/90	07/27/90
SAMPLE TIME	1732	1808	0930

CONSTITUENT	ug/l	ug/l	ug/l
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Purgeable Organics
EPA Method 601

Bromodichloromethane	<1.0	<1.0	<1.0
Bromoform	<1.0	<1.0	<1.0
Bromomethane	<1.0	<1.0	<1.0
Carbon tetrachloride	<0.50	<0.50	<0.50
Chlorobenzene	<1.0	122	<1.0
Chloroethane	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	<1.0	<1.0	<1.0
2-Chlorotoluene	<1.0	98	<1.0
Chloroform	<1.0	<1.0	<1.0
Chloromethane	<1.0	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	3.9	<1.0
1,3-Dichlorobenzene	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	<0.50	3.3	<0.50
1,1-Dichloroethane	<1.0	<1.0	<1.0
1,2-Dichloroethane	<0.50	<0.50	<0.50
1,1-Dichloroethene	<0.50	<0.50	<0.50
cis-1,2-Dichloroethene	6.2	1100	<1.0
trans-1,2-Dichloroethene	<1.0	14	<1.0
1,2-Dichloropropane	<1.0	<1.0	<1.0
cis-1,3-Dichloropropene	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0

cc: Envirocon, Livingston

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Water Analysis

PROJECT: Livingston / BN

LAB NO.	90-20387	90-20388	90-20389
SAMPLE IDENTIFICATION	140101-506	140101-507	140101-498
SAMPLE SUBMITTED	07/30/90	07/30/90	07/30/90
DATE REPORTED	08/15/90	08/15/90	08/15/90
SAMPLE DATE	07/27/90	07/27/90	07/27/90
SAMPLE TIME	1732	1808	0930
CONSTITUENT	ug/l	ug/l	ug/l
Methylene chloride	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0
Tetrachloroethene	400	1.3	<0.50
1,1,1-Trichloroethane	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	<1.0	<1.0	<1.0
Trichloroethene	14	12	<0.50
Trichlorofluoromethane	<1.0	<1.0	<1.0
Vinyl chloride	<0.50	1.1	<0.50
Dichlorodifluoromethane	<1.0	<1.0	<1.0

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Water Analysis

PROJECT: Livingston / BN

LAB NO.	90-20380	90-20381	90-20382
SAMPLE IDENTIFICATION	140101-499	140101-500	140101-501
SAMPLE SUBMITTED	07/30/90	07/30/90	07/30/90
DATE REPORTED	08/15/90	08/15/90	08/15/90
SAMPLE DATE	07/27/90	07/27/90	07/27/90
SAMPLE TIME	1200	1310	1511
CONSTITUENT	ug/l	ug/l	ug/l
Dichlorodifluoromethane	<1.0	<1.0	<1.0
Chloromethane	<1.0	<1.0	<1.0
Vinyl chloride	<0.50	<0.50	<0.50
Bromomethane	<1.0	<1.0	<1.0
Chloroethane	<1.0	<1.0	<1.0
Trichlorofluoromethane	<1.0	<1.0	<1.0
1,1-Dichloroethene	<0.50	<0.50	<0.50
Methylene Chloride	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	<1.0	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0	<1.0
2,2-Dichloropropane	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	<1.0	<1.0	<1.0
Chloroform	<1.0	<1.0	<1.0
Bromochloromethane	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	<0.50	<0.50	<0.50
Carbon Tetrachloride	<0.50	<0.50	<0.50
1,1-Dichloropropene	<1.0	<1.0	<1.0
Benzene	<0.50	0.83	<0.50
1,2-Dichloroethane	<0.50	<0.50	<0.50
Trichloroethene	<0.50	<0.50	<0.50
1,2-Dichloropropane	<1.0	<1.0	<1.0
Bromodichloromethane	<1.0	<1.0	<1.0
Dibromomethane	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0	<1.0
Tetrachloroethene	<0.50	<0.50	<0.50
1,3-Dichloropropane	<1.0	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0	<1.0
1,2-Dibromoethane	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0
1,1,1,2-Tetrachloroethane	<1.0	<1.0	<1.0

cc: Envirocon, Livingston

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MISSOULA MT 59807

Water Analysis

PROJECT: Livingston/BN

LAB NO.	90-20380	90-20381	90-20382
SAMPLE IDENTIFICATION	140101-499	140101-500	140101-501
SAMPLE SUBMITTED	07/30/90	07/30/90	07/30/90
DATE REPORTED	08/15/90	08/15/90	08/15/90
SAMPLE DATE	07/27/90	07/27/90	07/27/90
SAMPLE TIME	1200	1310	1511
CONSTITUENT	ug/l	ug/l	ug/l
Ethylbenzene	<1.0	7.7	<1.0
p-Xylene	<1.0	<1.0	<1.0
m-Xylene	<1.0	<1.0	<1.0
o-Xylene	<1.0	1.5	<1.0
Styrene	<1.0	<1.0	<1.0
Bromoform	<1.0	<1.0	<1.0
Isopropylbenzene	<1.0	6.1	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0
Bromobenzene	<1.0	<1.0	<1.0
1,2,3-Trichloropropane	<1.0	<1.0	<1.0
n-Propylbenzene	<1.0	4.3	<1.0
2-Chlorotoluene	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0
4-Chlorotoluene	<1.0	<1.0	<1.0
tert-Butylbenzene	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0
sec-Butylbenzene	<1.0	4.1	<1.0
p-Isopropyltoluene	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	<0.50	<0.50	<0.50
n-Butylbenzene	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0
1,2-Dibromo-3-Chloropropane	<1.0	<1.0	<1.0
1,2,4-Trichlorobenzene	<1.0	<1.0	<1.0
Hexachlorobutadiene	<1.0	<1.0	<1.0
Naphthalene	<1.0	40	<1.0
1,2,3-Trichlorobenzene	<1.0	<1.0	<1.0
cis-1,3-Dichloropropene	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0

REMARKS: Sample was properly
preserved and in specified
container. Sample was analyzed
in accordance with EPA method
524.2.

cc: Envirocon, Livingston

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Quality Assurance-Spiked Analysis

PROJECT: Livingston / BN

Lab No. 90-20381 was spiked with the following constituents
with these results:

Constituent	Spike Amount ug/l	P (%)	Range for P (%)
1,1-Dichloroethene	5.0	71	60-140
Benzene	5.0	122	60-140
Trichloroethene	5.0	104	60-140
Toluene	5.0	124	60-140
Chlorobenzene	5.0	135	60-140

P = Percent recovery measured.

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ENVIROCON
PO BOX 8243
MISSOULA MT 59807

WATER VOLATILE SURROGATE RECOVERY

PROJECT: Livingston/BN

SAMPLE NO.	S1 (TOL)#	S2 (BFB)#	S3 (DCE)#
90-20380	96	92	84
90-20381	105	102	104
90-20382	111	95	103
90-20383	109	96	107

	QC LIMITS
S1 (TOL) = Toluene-d8	(80-120)
S2 (BFB) = Bromofluorobenzene	(80-120)
S3 (DCE) = 1,2-Dichloroethane-d4	(80-120)

Column to be used to flag recovery values with an asterisk

* Values outside of contract required QC limits

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PO BOX 8243
MISSOULA MT 59807

Water Analysis

PROJECT: Livingston / BN

LAB NO.	89-2 90-20383	B 90-20380
SAMPLE IDENTIFICATION	140101-502	140101-499
SAMPLE SUBMITTED	07/30/90	07/30/90
DATE REPORTED	08/15/90	08/15/90
SAMPLE DATE	07/27/90	07/27/90
SAMPLE TIME	1511	1200

CONSTITUENT	ug/l	ug/l
Dichlorodifluoromethane	<1.0	<1.0
Chloromethane	<1.0	<1.0
Vinyl chloride	<0.50	<0.50
Bromomethane	<1.0	<1.0
Chloroethane	<1.0	<1.0
Trichlorofluoromethane	<1.0	<1.0
1,1-Dichloroethene	<0.50	<0.50
Methylene Chloride	<1.0	<1.0
trans-1,2-Dichloroethene	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0
2,2-Dichloropropane	<1.0	<1.0
cis-1,2-Dichloroethene	<1.0	<1.0
Chloroform	<1.0	<1.0
Bromochloromethane	<1.0	<1.0
1,1,1-Trichloroethane	<0.50	<0.50
Carbon Tetrachloride	<0.50	<0.50
1,1-Dichloropropene	<1.0	<1.0
Benzene	<0.50	<0.50
1,2-Dichloroethane	<0.50	<0.50
Trichloroethene	<0.50	<0.50
1,2-Dichloropropane	<1.0	<1.0
Bromodichloromethane	<1.0	<1.0
Dibromomethane	<1.0	<1.0
Toluene	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0
Tetrachloroethene	<0.50	<0.50
1,3-Dichloropropane	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0
1,2-Dibromoethane	<1.0	<1.0
Chlorobenzene	<1.0	<1.0
1,1,1,2-Tetrachloroethane	<1.0	<1.0

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ENVIROCON
PO BOX 8243
MISSOULA MT 59807

Water Analysis

PROJECT: Livingston/BN

LAB NO.	892 90-20383	B Duplicate 90-20380
SAMPLE IDENTIFICATION	140101-502	140101-499
SAMPLE SUBMITTED	07/30/90	07/30/90
DATE REPORTED	08/15/90	08/15/90
SAMPLE DATE	07/27/90	07/27/90
SAMPLE TIME	1511	1200

CONSTITUENT	ug/l	ug/l
Ethylbenzene	<1.0	<1.0
p-Xylene	<1.0	<1.0
m-Xylene	<1.0	<1.0
o-Xylene	<1.0	<1.0
Styrene	<1.0	<1.0
Bromoform	<1.0	<1.0
Isopropylbenzene	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0
Bromobenzene	<1.0	<1.0
1,2,3-Trichloropropane	<1.0	<1.0
n-Propylbenzene	<1.0	<1.0
2-Chlorotoluene	<1.0	<1.0
1,3,5-Trimethylbenzene	<1.0	<1.0
4-Chlorotoluene	<1.0	<1.0
tert-Butylbenzene	<1.0	<1.0
1,2,4-Trimethylbenzene	<1.0	<1.0
sec-Butylbenzene	<1.0	<1.0
p-Isopropyltoluene	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0
1,4-Dichlorobenzene	<0.50	<0.50
n-Butylbenzene	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0
1,2-Dibromo-3-Chloropropane	<1.0	<1.0
1,2,4-Trichlorobenzene	<1.0	<1.0
Hexachlorobutadiene	<1.0	<1.0
Naphthalene	<1.0	<1.0
1,2,3-Trichlorobenzene	<1.0	<1.0
cis-1,3-Dichloropropene	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0

REMARKS: Sample was properly
preserved and in specified
container. Sample was analyzed
in accordance with EPA method
524.2.

cc: Envirocon, Livingston

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Water Analysis

PROJECT: Livingston / BN

LAB NO.	90-20384	90-20385	90-20386
SAMPLE IDENTIFICATION	140101-503	140101-504	140101-505
SAMPLE SUBMITTED	07/30/90	07/30/90	07/30/90
DATE REPORTED	08/15/90	08/15/90	08/15/90
SAMPLE DATE	07/27/90	07/27/90	07/27/90
SAMPLE TIME	1555	1625	1703

CONSTITUENT	ug/l	ug/l	ug/l
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Purgeable Organics
EPA Method 601

Bromodichloromethane	<1.0	<1.0	<1.0
Bromoform	<1.0	<1.0	<1.0
Bromomethane	<1.0	<1.0	<1.0
Carbon tetrachloride	<0.50	<0.50	<0.50
Chlorobenzene	<1.0	2.1	<1.0
Chloroethane	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	<1.0	<1.0	<1.0
2-Chlorotoluene	<1.0	1.1	<1.0
Chloroform	<1.0	<1.0	<1.0
Chloromethane	<1.0	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	1.4	<1.0
1,3-Dichlorobenzene	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	<0.50	1.0	<0.50
1,1-Dichloroethane	<1.0	<1.0	<1.0
1,2-Dichloroethane	<0.50	<0.50	<0.50
1,1-Dichloroethene	<0.50	<0.50	<0.50
cis-1,2-Dichloroethene	56	301	2.0
trans-1,2-Dichloroethene	<1.0	3.6	<1.0
1,2-Dichloropropane	<1.0	<1.0	<1.0
cis-1,3-Dichloropropene	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0

cc: Envirocon, Livingston

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PO BOX 8243
MISSOULA MT 59807

Water Analysis

PROJECT: Livingston / BN

LAB NO.	90-20384	90-20385	90-20386
SAMPLE IDENTIFICATION	140101-503	140101-504	140101-505
SAMPLE SUBMITTED	07/30/90	07/30/90	07/30/90
DATE REPORTED	08/15/90	08/15/90	08/15/90
SAMPLE DATE	07/27/90	07/27/90	07/27/90
SAMPLE TIME	1555	1625	1703
CONSTITUENT	ug/l	ug/l	ug/l
Methylene chloride	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0
Tetrachloroethene	110	114	192
1,1,1-Trichloroethane	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	<1.0	<1.0	<1.0
Trichloroethene	11	25	4.5
Trichlorofluoromethane	<1.0	<1.0	<1.0
Vinyl chloride	<0.50	<0.50	<0.50
Dichlorodifluoromethane	<1.0	<1.0	<1.0

cc: Envirocon, Livingston

COMPLETE ENVIRONMENTAL ANALYTICAL SERVICE

